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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/625,830	07/22/2003	Glenn Houser	034126-003	8963

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EXAMINER

ROSENBERGER, RICHARD A

ART UNIT	PAPER NUMBER
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2877

DATE MAILED: 03/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

31

Office Action Summary	Application No. 10/625,830	Applicant(s) HOUSER, GLENN	
	Examiner Richard A. Rosenberger	Art Unit 2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 9-33 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 9-33 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>12/22/05</u> | 6) <input type="checkbox"/> Other: ____ |

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al (US 6,392,756) in view of Adams (US 4,899,055)).

As in independent claims 1, 16, and 28, The Li et al reference shows a tunable light source (56; col. 8, lns. 42-43). The reference shows a first detector (60) which detects light reflected from (claim 5) or transmitted through (claim 6) the material (figs. 9, 10,12), and a computing device (64) which calculates the thickness of a layer based upon the detected light.

As in claim 28, and claims 2 and 17, the Li et al reference teaches the light source can be “a tunable laser or any other suitable light source ...”. The instant specification (pg. 6, lns. 19-20) states the light source is “a quasi-monochromatic light source (laser) capable of varying its wavelength”; thus the “tunable laser” of the Li et al reference falls within the meaning of the term “quasi-monochromatic light source” as used in this specification.

The Li et al reference discloses that “typically”, or “for example”, the measurements are made at “1 nm intervals” (col. 7, ln. 63; col. 9, ln. 39) rather than the “less than 0.5 nm” increments of claim 28, and of claims 4 and 19 and the “less than 0.1 nm” increments of claim 31. As set forth in the Li reference, this increment is not

critical, and other increments could be chosen in accordance with such criteria as the accuracy and precision desired, with smaller increments providing more data for higher accuracy, precision, and thus reliability of the measurements. Those in the art would thus have found it obvious to use the claimed “less than 0.5 nm” increments, or the “less than 0.1 nm” increments of claims 31, in order to achieve the higher precision, accuracy and reliability that the increased data would provide. The reference teaches making measurements “at at least 10 different wavelengths”, as in claims 23.

As for claims 1, 16, 29 and 30, The Li et al reference does not teach the claimed splitter and second detector forming a reference path to “calibrate the light source”. The Adams reference shows, in a film thickness measuring system, a beam splitter (20), a filter (34), and a detector (32), and teaches that this arrangement can be “used to provide wavelength calibration” (col. 5, lns. 21-22). It would have been obvious to include such a known wavelength calibration in the system such as shown by the Li et al reference because the accuracy of the measurements in a system such as shown by the Li et al reference depends at least in part on the accuracy of the knowledge of what the wavelengths being used actually are.

The Li et al reference teaches that the light detector can be any “suitable light detector” (col. 8, ln. 56). Photodiodes as light detectors are so well known that official notice is sufficient. As in claims 3 and 18, it would have been obvious to choose a known photodiode detector as the “suitable light detector” taught by the Li et al reference.

As in claims 7 and 32, the Li et al reference teaches that the light is “at a near-normal incidence” (col. 8, ln. 47), which at least clearly suggests the claimed “less than $\pm 5^\circ$ ”.

As for claim 9-12, those in the art could choose appropriate optics and electronics to use in a system such as that of claim 1; lenses and their uses, voltage converters and A/D converters are so well known in the art that official notice is sufficient.

As for claims 20 and 33, it would have been obvious to use the technique of the reference to measure other thin film thicknesses that the particular thicknesses discussed in the reference and on substrates such as semiconductor wafers; the technique is, and would have been recognized as, a more general technique applicable to other thicknesses and as not being limited to the material of the substrate. As for claim 33, those in the art could choose appropriate wavelengths at which to make the measurement.

As for claim 21, it would have been obvious to make the thickness measurement as accurate as needed or desired for the application at hand. The reference teaches the film thickness can be measured "to within an accuracy of 3 Angstroms or less", if the film being measured has a thickness of more than 300 Angstroms (30 nm, 0.03 μm), then this accuracy would be the claimed less than 1%.

As for claim 22, the reference does not disclose the size of the light spot on the film being measured; it would have been obvious to make the light spot small, including the claimed "less than 200 μm " because a small light spot would make a measurement of a small area and would thus be more accurate by minimizing the problem of the film possibly having different thicknesses at different locations which would degrade a measurement made over a larger area.

3. Claims 13-15 and 24-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al (US 6,392,756) and Adams (US 4,899,055), as applied to claims 12 above, and further in view of Ruhl, Jr., et al (US 5,357,336).

As discussed above with reference to the Adams reference, in order for the technique of Li et al to be highly accurate, it is necessary to know with precision the wavelengths of the light at the various measuring points. It is known in the art, as shown by Ruhl et al, to use an etalon to calibrate the wavelength of a light source; it would have been obvious to include a known wavelength calibration systems, such as an etalon-based system such as shown by Ruhl et al for the wavelength calibration system of Adams because this use of an etalon calibration system is a known, and known to be accurate, wavelength calibration system.

As in claim 26, the Li et al reference mentions the use of theoretical models in the calculation of the thickness (col. 11, lns. 32-43).

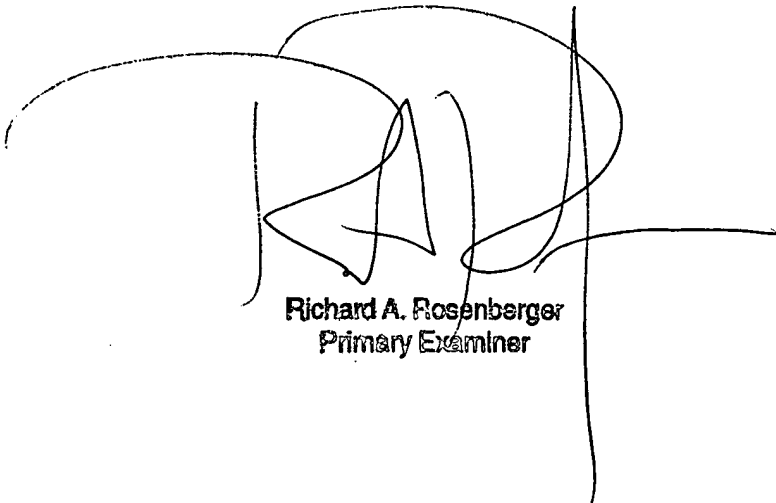
4. The remarks filed 22 December 2004 have been considered. As set forth above, those in the art know to use a splitter to create a reference path to calibrate the light source. Clearly using such a reference path to accurately determine the characteristic of the light will in no manner "destroy the objective or function sought to be achieved by Li" (remarks, sentence bridging pages 9 and 10), but will enhance the function by adding information useful for accuracy, precision, and reliability.

Art Unit: 2877

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard A Rosenberger whose telephone number is (571) 272-2428. The examiner can normally be reached on Monday through Friday during the hours of 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr. can be reached on (571) 272-2800 ext. 77. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

R. A. Rosenberger
6 March 2006



Richard A. Rosenberger
Primary Examiner